per hour for the additional 28 kilometers (15 nautical miles).

Ice Loading: Encased in 1.25 centimeters (½ inch) radial thickness of clear ice.

Antenna Radome De-Icing: Down to −6° C (20° F) and wind up to 35 knots.

(d) The transmitter frequencies of an MLS must be in accordance with the frequency plan approved by the FAA.

(e) The DME component listed in paragraph (a)(4) of this section must comply with the minimum standard performance requirements specified in subpart G of this part.

(f) The marker beacon components listed in paragraph (b)(4) of this section must comply with the minimum standard performance requirements specified in subpart H of this part.

§ 171.311 Signal format requirements.

The signals radiated by the MLS must conform to the signal format in which angle guidance functions and data functions are transmitted sequentially on the same C-band frequency. Each function is identified by a unique digital code which initializes the airborne receiver for proper processing. The signal format must meet the following minimum requirements:

(a) *Frequency assignment.* The ground components (except DME/Marker Beacon) must operate on a single frequency assignment or channel, using time division multiplexing. These components must be capable of operating on any one of the 200 channels spaced 300 KHz apart with center frequencies from 5031.0 MHz to 5090.7 MHz and with channel numbering as shown in Table 1a. The operating radio frequencies of all ground components must not vary by more than ±10 KHz from the assigned frequency. Any one transmitter frequency must not vary more than ±50 Hz in any one second period. The MLS angle/data and DME equipment must operate on one of the paired channels as shown in Table 1b.

TABLE 1a—FREQUENCY CHANNEL PLAN

Channel No.	Frequency (MHz)
500	5031.0
501	5031.3
502	5031.6
503	5031.9
504	5032.2
505	5032.5
506	5032.8
507	5033.1
508	5033.4
509	5033.7
510	5034.0
511	5034.3
* * * * *	
598	5060.4
599	5060.7
600	5061.0
601	5061.3
* * * * *	
698	5090.4
699	5090.7

TABLE 1 b—CHANNELS

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	DME/P Mode IA µs	DME/P Mode FA µs	Freq. MHz	Pulse codes µs
*1X				1025	12			962	12
**1Y				1025	36			1088	30
*2X				1026	12			963	12
**2Y				1026	36			1089	30
*3X				1027	12			964	12
**3Y				1027	36			1090	30
*4X				1028	12			965	12
**4Y				1028	36			1091	30
*5X				1029	12			966	12
**5Y				1029	36			1092	30
*6X				1030	12			967	12
**6Y				1030	36			1093	30
*7X				1031	12			968	12
**7Y				1031	36			1094	30
*8X				1032	12			969	12

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P Mode			
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	IA µs	FA µs	Freq. MHz	Pulse codes µs
**8Y	....	....	....	1032	36	....	....	1095	30
*9X	....	....	....	1033	12	....	....	970	12
**9Y	....	....	....	1033	36	....	....	1096	30
*10X	....	....	....	1034	12	....	....	971	12
**10Y	....	....	....	1034	36	....	....	1097	30
*11X	....	....	....	1035	12	....	....	972	12
**11Y	....	....	....	1035	36	....	....	1098	30
*12X	....	....	....	1036	12	....	....	973	12
**12Y	....	....	....	1036	36	....	....	1099	30
*13X	....	....	....	1037	12	....	....	974	12
**13Y	....	....	....	1037	36	....	....	1100	30
*14X	....	....	....	1038	12	....	....	975	12
**14Y	....	....	....	1038	36	....	....	1101	30
*15X	....	....	....	1039	12	....	....	976	12
**15Y	....	....	....	1039	36	....	....	1102	30
*16X	....	....	....	1040	12	....	....	977	12
**16Y	....	....	....	1040	36	....	....	1103	30
∇17X	108.00	....	....	1041	12	....	....	978	12
17Y	108.05	5043.0	540	1041	36	36	42	1104	30
17Z	....	5043.3	541	1041	....	21	27	1104	15
18X	108.10	5031.0	500	1042	12	12	18	979	12
18W	....	5031.3	501	1042	....	24	30	979	24
18Y	108.15	5043.6	542	1042	36	36	42	1105	30
18Z	....	5043.9	543	1042	....	21	27	1105	15
19X	108.20	....	....	1043	12	....	....	980	12
19Y	108.25	5044.2	544	1043	36	36	42	1106	30
19Z	....	5044.5	545	1043	....	21	27	1106	15
20X	108.30	5031.6	502	1044	12	12	18	981	12
20W	....	5031.9	503	1044	....	24	30	981	24
20Y	108.35	5044.8	546	1044	36	36	42	1107	30
20Z	....	5045.1	547	1044	....	21	27	1107	15
21X	108.40	....	....	1045	12	....	....	982	12
21Y	108.45	5045.4	548	1045	36	36	42	1108	30
21Z	....	5045.7	549	1045	....	21	27	1108	15
22X	108.50	5032.2	504	1046	12	12	18	983	12
22W	....	5032.5	505	1046	....	24	30	983	24
22Y	108.55	5046.0	550	1046	36	36	42	1109	30
22Z	....	5046.3	551	1046	....	21	27	1109	15
23X	108.60	....	....	1047	12	....	....	984	12
23Y	108.65	5046.6	552	1047	36	36	42	1110	30
23Z	....	5046.9	553	1047	....	21	27	1110	15
24X	108.70	5032.8	506	1048	12	12	18	985	12
24W	....	5033.1	507	1048	....	24	30	985	24
24Y	108.75	5047.2	554	1048	36	36	42	1111	30
24Z	....	5047.5	555	1048	....	21	27	1111	15
25X	108.80	....	....	1049	12	....	....	986	12
25Y	108.85	5047.8	556	1049	36	36	42	1112	30
25Z	....	5048.1	557	1049	....	21	27	1112	15
26X	108.90	5033.4	508	1050	12	12	18	987	12
26W	....	5033.7	509	1050	....	24	30	987	24
26Y	108.95	5048.4	558	1050	36	36	42	1113	30
26Z	....	5048.7	559	1050	....	21	27	1113	15
27X	109.00	....	....	1051	12	....	....	988	12
27Y	109.05	5049.0	560	1051	36	36	42	1114	30
27Z	....	5049.3	561	1051	....	21	27	1114	15
28X	109.10	5034.0	510	1052	12	12	18	989	12
28W	....	5034.3	511	1052	....	24	30	989	24
28Y	109.15	5049.6	562	1052	36	36	42	1115	30
28Z	....	5049.9	563	1052	....	21	27	1115	15
29X	109.20	....	....	1053	12	....	....	990	12
29Y	109.25	5050.2	564	1053	36	36	42	1116	30
29Z	....	5050.5	565	1043	....	21	27	1116	15
30X	109.30	5034.6	512	1054	12	12	18	991	12
30W	....	5034.9	513	1054	....	24	30	991	24
30Y	109.35	5050.8	566	1054	36	36	42	1117	30

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P Mode			
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	IA µs	FA µs	Freq. MHz	Pulse codes µs
30Z	....	5051.1	567	1054	....	21	27	1117	15
31X	109.40	....	....	1055	12	....	....	992	12
31Y	109.45	5051.4	568	1055	36	36	42	1118	30
31Z	....	5051.7	569	1055	....	21	27	1118	15
32X	109.50	5035.2	514	1056	12	12	18	993	12
32W	....	5035.5	515	1056	....	24	30	993	24
32Y	109.55	5052.0	570	1056	36	36	42	1119	30
32Z	....	5052.3	571	1056	....	21	27	1119	15
33X	109.60	....	....	1057	12	....	....	994	12
33Y	109.65	5052.6	572	1057	36	36	42	1120	30
33Z	....	5052.9	573	1057	....	21	27	1120	15
34X	109.70	5035.8	516	1058	12	12	18	995	12
34W	....	5036.1	517	1058	....	24	30	995	24
34Y	109.75	5053.2	574	1058	36	36	42	1121	30
34Z	....	5053.5	575	1058	....	21	27	1121	15
35X	109.80	....	....	1059	12	....	....	996	12
35Y	109.85	5053.8	576	1059	36	36	42	1122	30
35Z	....	5054.1	577	1059	....	21	27	1122	15
36X	109.90	5036.4	518	1060	12	12	18	997	12
36W	....	5036.7	519	1060	....	24	30	997	24
36Y	109.95	5054.4	578	1060	36	36	42	1123	30
36Z	....	5054.7	579	1060	....	21	27	1123	15
37X	110.00	....	....	1061	12	....	....	998	12
37Y	110.05	5055.0	580	1061	36	36	42	1124	30
37Z	....	5055.3	581	1061	....	21	27	1124	15
38X	110.10	5037.0	520	1062	12	12	18	999	12
38W	....	5037.3	521	1062	....	24	30	999	24
38Y	110.15	5055.6	582	1062	36	36	42	1125	30
38Z	....	5055.9	583	1062	....	21	27	1125	15
39X	110.20	....	....	1063	12	....	....	1000	12
39Y	110.25	5056.2	584	1063	36	36	42	1126	30
39Z	....	5056.5	585	1063	....	21	27	1126	15
40X	110.30	5037.6	522	1064	12	12	18	1001	12
40W	....	5037.9	523	1064	....	24	30	1001	24
40Y	110.35	5056.8	586	1064	36	36	42	1127	30
40Z	....	5057.1	587	1064	....	21	27	1127	15
41X	110.40	....	....	1065	12	....	....	1002	12
41Y	110.45	5057.4	588	1065	36	36	42	1128	30
41Z	....	5057.7	589	1065	....	21	27	1128	15
42X	110.50	5038.2	524	1066	12	12	18	1003	12
42W	....	5038.5	525	1066	....	24	30	1003	24
42Y	110.55	5058.0	590	1066	36	36	42	1129	30
42Z	....	5058.3	591	1066	....	21	27	1129	15
43X	110.60	....	....	1067	12	....	....	1004	12
43Y	110.65	5058.6	592	1067	36	36	42	1130	30
43Z	....	5058.9	593	1067	....	21	27	1130	15
44X	110.70	5038.8	526	1068	12	12	18	1005	12
44W	....	5039.1	527	1068	....	24	30	1005	24
44Y	110.75	5059.2	594	1068	36	36	42	1131	30
44Z	....	5059.5	595	1068	....	21	27	1131	15
45X	110.80	....	....	1069	12	....	....	1006	12
45Y	110.85	5059.8	596	1069	36	36	42	1132	30
45Z	....	5060.1	597	1069	....	21	27	1132	15
46X	110.90	5039.4	528	1070	12	12	18	1007	12
46W	....	5039.7	529	1070	....	24	30	1007	24
46Y	110.95	5060.4	598	1070	36	36	42	1133	30
46Z	....	5060.7	599	1070	....	21	27	1133	15
47X	111.00	....	....	1071	12	....	....	1008	12
47Y	111.05	5061.0	600	1071	36	36	42	1134	30
47Z	....	5061.3	601	1071	....	21	27	1134	15
48X	111.10	5040.0	530	1072	12	12	18	1009	12
48W	....	5040.3	531	1072	....	24	30	1009	24
48Y	111.15	5061.6	602	1072	36	36	42	1135	30
48Z	....	5061.9	603	1072	....	21	27	1135	15
49X	111.20	....	....	1073	12	....	....	1010	12

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	DME/P Mode		Freq. MHz	Pulse codes µs
						IA µs	FA µs		
49Y	111.25	5062.2	604	1073	36	36	42	1136	30
49Z		5062.5	605	1073		21	27	1136	15
50X	111.30	5040.6	532	1074	12	12	18	1011	12
50W		5040.9	533	1074		24	30	1011	24
50Y	111.35	5062.8	606	1074	36	36	42	1137	30
50Z		5063.1	607	1074		21	27	1137	15
51X	111.40			1075	12			1012	12
51Y	111.45	5063.4	608	1075	36	36	42	1138	30
51Z		5063.7	609	1075		21	27	1138	15
52X	111.50	5041.2	534	1076	12	12	18	1013	12
52W		5041.5	535	1076		24	30	1013	24
52Y	111.55	5064.0	610	1076	36	36	42	1139	30
52Z		5064.3	611	1076		21	27	1139	15
53X	111.60			1077	12			1014	12
53Y	111.65	5064.6	612	1077	36	36	42	1140	30
53Z		5064.9	613	1077		21	27	1140	15
54X	111.70	5041.8	536	1078	12	12	18	1015	12
54W		5042.1	537	1078		24	30	1015	24
54Y	111.75	5065.2	614	1078	36	36	42	1141	30
54Z		5065.5	615	1078		21	27	1141	15
55X	111.80			1079	12			1016	12
55Y	111.85	5065.8	616	1079	36	36	42	1142	30
55Z		5066.1	617	1079		21	27	1142	15
56X	111.90	5042.4	538	1080	12	12	18	1017	12
56W		5042.7	539	1080		24	30	1017	24
56Y	111.95	5066.4	618	1080	36	36	42	1143	30
56Z		5066.7	619	1080		21	27	1143	15
57X	112.00			1081	12			1018	12
57Y	112.05			1081	36			1144	30
58X	112.10			1082	12			1019	12
58Y	112.15			1082	36			1145	30
59X	112.20			1083	12			1020	12
59Y	122.25			1083	36			1146	30
** 60X				1084	12			1021	12
** 60Y				1084	36			1147	30
** 61X				1085	12			1022	12
** 61Y				1085	36			1148	30
** 62X				1086	12			1023	12
** 62Y				1086	36			1149	30
** 63X				1037	12			1024	12
** 63Y				1087	36			1150	30
** 64X				1088	12			1151	12
** 64Y				1088	36			1025	30
** 65X				1089	12			1152	12
** 65Y				1089	36			1026	30
** 66X				1090	12			1153	12
** 66Y				1090	36			1027	30
** 67X				1091	12			1154	12
** 67Y				1091	36			1028	30
** 68X				1092	12			1155	12
** 68Y				1092	36			1029	30
** 69X				1093	12			1156	12
** 69Y				1093	36			1030	30
70X	112.30			1094	12			1157	12
** 70Y	112.35			1094	36			1031	30
71X	112.40			1095	12			1158	12
** 71Y	112.45			1095	36			1032	30
72X	112.50			1096	12			1159	12
** 72Y	112.55			1096	36			1033	30
73X	112.60			1097	12			1160	12
** 73Y	112.65			1097	36			1034	30
74X	112.70			1098	12			1161	12
** 74Y	112.75			1098	36			1035	30
75X	112.80			1099	12			1162	12
** 75Y	112.85			1099	36			1036	30

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P Mode			
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	IA µs	FA µs	Freq. MHz	Pulse codes µs
76X	112.90	....	....	1100	12	....	....	1163	12
** 76Y	112.95	....	....	1100	36	....	....	1037	30
77X	113.00	....	....	1101	12	....	....	1164	12
** 77Y	113.05	....	....	1101	36	....	....	1038	30
78X	113.10	....	....	1102	12	....	....	1165	12
** 78Y	113.15	....	....	1102	36	....	....	1039	30
79X	113.20	....	....	1103	12	....	....	1166	12
** 79Y	113.25	....	....	1103	36	....	....	1040	30
80X	113.30	....	....	1104	12	....	....	1167	12
80Y	113.35	5067.0	620	1104	36	36	42	1041	30
80Z	....	5067.3	621	1104	....	21	27	1041	15
81X	113.40	....	....	1105	12	....	....	1168	12
81Y	113.45	5067.6	622	1105	36	36	42	1042	30
81Z	....	5067.9	623	1005	....	21	27	1042	15
82X	113.50	....	....	1106	12	....	....	1169	12
82Y	113.55	5068.2	624	1106	36	36	42	1043	30
82Z	....	5068.5	625	1106	....	21	27	1043	15
83X	113.60	....	....	1107	12	....	....	1170	12
83Y	113.65	5068.8	626	1107	36	36	42	1044	30
83Z	....	5069.1	627	1107	....	21	27	1044	15
84X	113.70	....	....	1108	12	....	....	1171	12
84Y	113.75	5069.4	628	1108	36	36	42	1045	30
84Z	....	6069.7	629	1108	....	21	27	1045	15
85X	113.80	....	....	1109	12	....	....	1172	12
85Y	113.85	5070.0	630	1109	36	36	42	1046	30
85Z	....	5070.3	631	1109	....	21	27	1046	15
86X	113.90	....	....	1110	12	....	....	1173	12
86Y	113.95	5070.6	632	1110	36	36	42	1047	30
86Z	....	5070.9	633	1110	....	21	27	1047	15
87X	114.00	....	....	1111	12	....	....	1174	12
87Y	114.05	5071.2	634	1111	36	36	42	1048	30
87Z	....	5071.5	635	1111	....	21	27	1048	15
88X	114.10	....	....	1112	12	....	....	1175	12
88Y	114.15	5071.8	636	1112	36	36	42	1049	30
88Z	....	5072.1	637	1112	....	21	27	1049	15
89X	114.20	....	....	1113	12	....	....	1176	12
89Y	114.25	5072.4	638	1113	36	36	42	1050	30
89Z	....	5072.7	639	1113	....	21	27	1050	15
90X	114.30	....	....	1114	12	....	....	1177	12
90Y	114.35	5073.0	640	1114	36	36	42	1051	30
90Z	....	5073.3	641	1114	....	21	27	1051	15
91X	114.40	....	....	1115	12	....	....	1178	12
91Y	114.45	5073.6	642	1115	36	36	42	1052	30
91Z	....	5073.9	643	1115	....	21	27	1052	15
92X	114.50	....	....	1116	12	....	....	1179	12
92Y	114.55	5074.2	644	1116	36	36	42	1053	30
92Z	....	5074.5	645	1116	....	21	27	1053	15
93X	114.60	....	....	1117	12	....	....	1180	12
93Y	114.65	5074.8	646	1117	36	36	42	1054	30
93Z	....	5075.1	647	1117	....	21	27	1054	15
94X	114.70	....	....	1118	12	....	....	1181	12
94Y	114.75	5075.4	648	1118	36	36	42	1055	30
94Z	....	5075.7	649	1118	....	21	27	1055	15
95X	114.80	....	....	1119	12	....	....	1182	12
95Y	114.85	5076.0	650	1119	36	36	42	1056	30
95Z	....	5076.3	651	1119	....	21	27	1056	15
96X	114.90	....	....	1120	12	....	....	1183	12
96Y	114.95	5076.6	652	1120	36	36	42	1057	30
96Z	....	5076.9	653	1120	....	21	27	1057	15
97X	115.00	....	....	1121	12	....	....	1184	12
97Y	115.05	5077.2	654	1121	36	36	42	1058	30
97Z	....	5077.5	655	1121	....	21	27	1058	15
98X	115.10	....	....	1122	12	....	....	1185	12
98Y	115.15	5077.8	656	1122	36	36	42	1059	30
98Z	....	5078.1	657	1122	....	21	27	1059	15

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P Mode			
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	IA µs	FA µs	Freq. MHz	Pulse codes µs
99X	115.20	....	....	1123	12	....	....	1186	12
99Y	115.25	5078.4	658	1123	36	36	42	1060	30
99Z	....	5078.7	659	1123	....	21	27	1060	15
100X	115.30	....	....	1124	12	....	....	1187	12
100Y	115.35	5079.0	660	1124	36	36	42	1061	30
100Z	....	5079.3	661	1124	....	21	27	1061	15
101X	115.40	....	....	1125	12	....	....	1188	12
101Y	115.45	5079.6	662	1125	36	36	42	1062	30
101Z	....	5079.9	663	1125	....	21	27	1062	15
102X	115.50	....	....	1126	12	....	....	1189	12
102Y	115.55	5080.2	664	1126	36	36	42	1063	30
102Z	....	5080.5	665	1126	....	21	27	1063	15
103X	115.60	....	....	1127	12	....	....	1190	12
103Y	115.65	5080.B	666	1127	36	36	42	1064	30
103Z	....	5081.1	667	1127	....	21	27	1064	19
104X	115.70	....	....	1128	12	....	....	1191	12
104Y	115.75	5081.4	668	1128	36	36	42	1065	30
104Z	....	5081.7	669	1128	....	21	27	1065	19
105X	115.80	....	....	1129	12	....	....	1192	12
105Y	115.85	5082.0	670	1129	36	36	42	1066	30
105Z	....	5082.3	671	1129	....	21	27	1066	15
106X	115.90	....	....	1130	12	....	....	1193	12
106Y	115.95	5082.6	672	1130	36	36	42	1067	30
106Z	....	5082.9	673	1130	....	21	27	1067	15
107X	116.00	....	....	1131	12	....	....	1194	12
107Y	116.05	5083.2	674	1131	36	36	42	1068	30
107Z	....	5083.5	675	1131	....	21	27	1068	15
108X	116.10	508	....	1132	12	....	....	1195	12
108Y	116.15	5083.8	676	1132	36	36	42	1069	30
108Z	....	5084.1	677	1132	....	21	27	1069	15
109X	116.20	....	....	1133	12	....	....	1196	12
109Y	116.25	5084.4	678	1133	36	36	42	1070	30
109Z	....	5084.7	679	1133	....	21	27	1070	15
110X	116.30	....	....	1134	12	....	....	1197	12
110Y	116.35	5085.0	680	1134	36	36	42	1071	30
110Z	....	5085.3	681	1134	....	21	27	1071	15
111X	116.40	....	....	1135	12	....	....	1198	12
111Y	116.45	5086.6	682	1135	36	36	42	1072	30
111Z	....	5085.9	683	1135	....	21	27	1072	15
112X	116.50	....	....	1136	12	....	....	1199	12
112Y	116.55	5086.2	684	1136	36	36	42	1073	30
112Z	....	5086.5	685	1136	....	21	27	1073	15
113X	116.60	....	....	1137	12	....	....	1200	12
113Y	116.65	5086.8	686	1137	36	36	42	1074	30
113Z	....	5087.1	687	1137	....	21	27	1074	15
114X	116.70	....	....	1138	12	....	....	1201	12
114Y	116.75	5087.4	688	1138	36	36	42	1075	30
114Z	....	5087.7	689	1138	....	21	27	1075	15
115X	116.80	....	....	1139	12	....	....	1202	12
115Y	116.85	5088.0	690	1139	36	36	42	1076	30
115Z	....	5088.3	691	1139	....	21	27	1076	15
116X	116.90	....	....	1140	12	....	....	1203	12
116Y	116.95	5088.6	692	1140	36	36	42	1077	30
116Z	....	5088.9	693	1140	....	21	27	1077	15
117X	117.00	....	....	1141	12	....	....	1204	12
117Y	117.05	5089.2	694	1141	36	36	42	1078	30
117Z	....	5089.5	695	1141	....	21	27	1078	15
118X	117.10	....	....	1142	12	....	....	12.5	12
118Y	117.15	5089.8	696	1142	36	36	42	1079	30
118Z	....	5090.1	697	1142	....	21	27	1079	12
119X	117.20	....	....	1143	12	....	....	1206	12
119Y	117.25	5090.4	698	1143	36	36	42	1080	30
119Z	....	5090.7	699	1143	....	21	27	1080	15
120X	117.30	....	....	1144	12	....	....	1207	12
120Y	117.35	....	....	1144	36	....	....	1081	30

TABLE 1 b—CHANNELS—Continued

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P Mode			
DME No.	VHF freq. MHz	MLS angle freq. MHz	MLS Ch. No.	Freq. MHz	DME/N µs	IA µs	FA µs	Freq. MHz	Pulse codes µs
121X	117.40			1145	12			1208	12
121Y	117.45			1145	36			1082	30
122X	117.50			1146	12			1209	12
122Y	117.55			1146	36			1083	30
123X	117.60			1147	12			1210	12
123Y	117.65			1147	36			1084	30
124X	117.70			1148	12			1211	12
** 124Y	117.75			1148	36			1085	30
125X	117.80			1149	12			1212	12
** 125Y	117.85			1149	36			1086	30
126X	117.90			1150	12			1213	12
** 126Y	117.95			1150	36			1087	30

Notes:

* These channels are reserved exclusively for national allotments.

** These channels may be used for national allotment on a secondary basis. The primary reason for reserving these channels is to provide protection for the secondary Surveillance Radar (SSR) system.

∇ 108.0 MHz is not scheduled for assignment to ILS service. The associated DME operating channel No. 17X may be assigned to the emergency service.

(b) *Polarization*. (1) The radio frequency emissions from all ground equipment must be nominally vertically polarized. Any horizontally polarized radio frequency emission component from the ground equipment must not have incorrectly coded angle information such that the limits specified in paragraphs (b) (2) and (3) of this section are exceeded.

(2) Rotation of the receiving antenna thirty degrees from the vertically polarized position must not cause the path following error to exceed the allowed error at that location.

(c) *Modulation requirements.* Each function transmitter must be capable of DPSK and continuous wave (CW) modulations of the RF carrier which have the following characteristics.

(1) DPSK. The DPSK signal must have the following characteristics:

bit rate	15.625 KHz
bit length	64 microseconds
logic "0"	no phase transition
logic "1"	phase transition
phase transition	less than 10 microseconds
phase tolerance	± 10 degrees

The phase shall advance (or retard) monotonically throughout the transition region. Amplitude modulation during the phase transition period shall not be used.

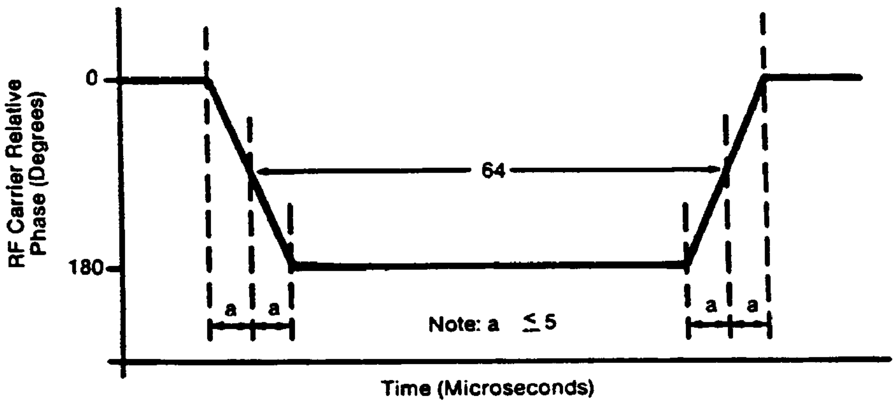


Figure 1.-DPSK Phase Characteristic

(2) CW. The CW pulse transmissions and the CW angle transmissions as may be required in the signal format of any function must have characteristics such that the requirements of paragraph (d) of this section are met.

(d) *Radio frequency signal spectrum.* The transmitted signal must be such that during the transmission time, the mean power density above a height of 600 meters (2000 feet) does not exceed −100.5 dBW/m^2 for angle guidance and −95.5 dBW/m^2 for data, as measured in a 150 KHz bandwidth centered at a frequency of 840 KHz or more from the assigned frequency.

(e) *Synchronization.* Synchronization between the azimuth and elevation components is required and, in split-site configurations, would normally be accomplished by landline interconnections. Synchronization monitoring must be provided to preclude function overlap.

(f) *Transmission rates.* Angle guidance and data signals must be transmitted at the following average repetition rates:

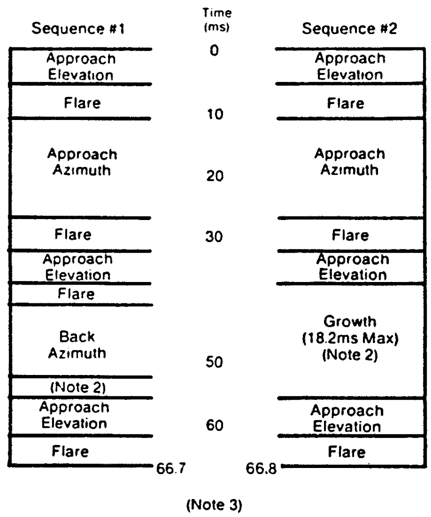
Function	Average data rate (Hertz)
Approach Azimuth	13±0.5
High Rate Approach Azimuth	[1] 39±1.5
Approach Elevation	39±1.5
Back Azimuth	6.5±0.25
Basic Data	([2])
Auxiliary Data	([3])

[1] The higher rate is recommended for azimuth scanning antennas with beamwidths greater than two degrees. It should be noted that the time available in the signal format for additional functions is limited when the higher rate is used.

[2] Refer to Table 8a.

[3] Refer to Table 8c.

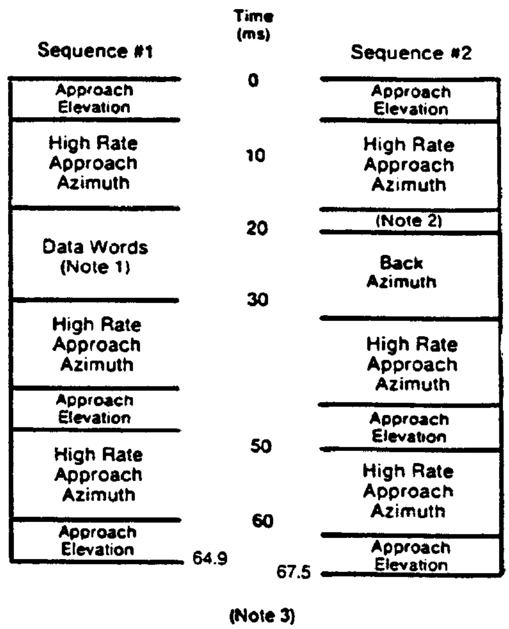
(g) *Transmission sequences.* Sequences of angle transmissions which will generate the required repetition rates are shown in Figures 2 and 3.



Notes:

1. When Back Azimuth is Provided, Basic Data Word # 2 Must Be Transmitted Only In This Position.
2. Data Words May Be Transmitted In Any Open Time Periods.
3. The Total Time Duration of Sequence #1 Plus Sequence #2 Must Not exceed 134 ms.

Figure 2. Transmission sequence pair which provides for all MLS angle guidance functions.



Notes:

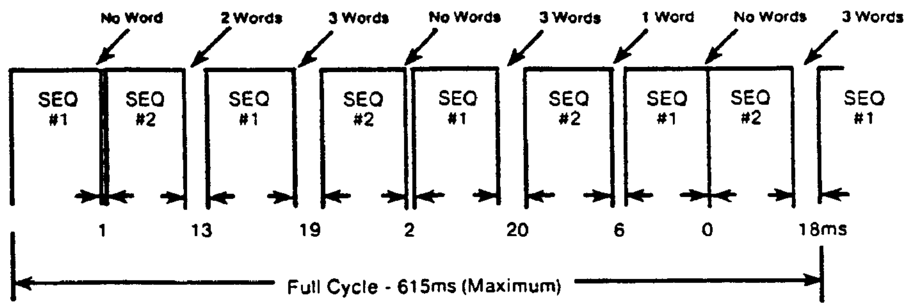
1. Data Words May Be Transmitted In Any Open Time Period.

2. When Back Azimuth Is Provided, Basic Data Word #2 Must Be Transmitted Only In This Position.

3. The Total Time Duration Of Sequence #1 Plus Sequence #2 Must Not Exceed 134 ms.

Figure 3. Transmission sequence pair which provides for the MLS high rate approach azimuth angle guidance function.

(h) *TDM cycle.* The time periods between angle transmission sequences must be varied so that exact repetitions do not occur within periods of less than 0.5 second in order to protect against synchronous interference. One such combination of sequences is shown in Figure 4 which forms a full multiplex cycle. Data may be transmitted during suitable open times within or between the sequences.



Note: Angle Sequence Are Those From Figure 2 Or 3. Do Not Mix Sequences.

Figure 4. A complete function multiplex cycle.

(i) *Function Formats (General).* Each angle function must contain the following elements: a preamble; sector signals; and a TO and FRO angle scan organized as shown in Figure 5a. Each data function must contain a preamble and a data transmission period organized as shown in Figure 5b.

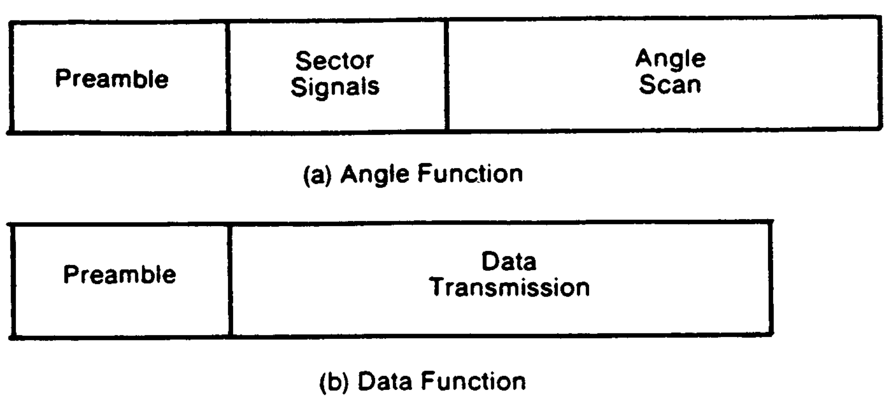


Figure 5 - Function format.

(1) *Preamble format.* The transmitted angle and date functions must use the preamble format shown in Figure 6. This format consists of a carrier acquisition period of unmodulated CW transmission followed by a receiver synchronization code and a function identification code. The preamble timing must be in accordance with Table 2.

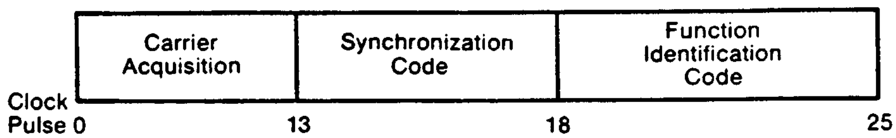


Figure 6 - Preamble organization.

(i) *Digital codes.* The coding used in the preamble for receiver synchronization is a Barker code logic 11101. The time of the last phase transition midpoint in the code shall be the receiver reference time (see Table 2). The function identification codes must be as shown in Table 3. The last two bits (I_{11} and I_{12}) of the code are parity bits obeying the equations:

$I_6+I_7+I_8+I_9+I_{10}+I_{11}=\text{Even}$

$I_6+I_8+I_{10}+I_{12}=\text{Even}$

(ii) *Data modulation.* The digital code portions of the preamble must be DPSK modulated in accordance with § 171.311(c)(1) and must be transmitted throughout the function coverage volume.

(2) *Angle function formats.* The timing of the angle transmissions must be in accordance with Tables 4a, 4b, and 5. The actual timing of the TO and FRO scans must be as required to meet the accuracy requirements of §§ 171.313 and 171.317.

(i) Preamble. Must be in accordance with requirements of § 171.311(i)(1).

TABLE 2—PREAMBLE TIMING [1]

Event	Event time slot begins at—	
	15.625 kHz clock pulse (number)	Time (milliseconds)
Carrier acquisition:		
(CW transmission)	0	0
Receiver reference time code:		
I_1=1	13	0.832
I_2=1	14	0.896
I_3=1	15	0.960
I_4=0	16	1.024
I_5=1	17	[2] 1.088
Function identification:		
I_6	18	1.152
I_7	19	1.216
I_8	20	1.280
I_9	21	1.344
I_{10} (see table 1)	22	1.408
I_{11}	23	1.472
I_{12}	24	1.536
END PREAMBLE	25	1.600

[1] Applies to all functions transmitted.
[2] Reference time for receiver synchronization for all function timing.

TABLE 3—FUNCTION IDENTIFICATION CODES

Function	Code						
	I_6	I_7	I_8	I_9	I_{10}	I_{11}	I_{12}
Approach azimuth	0	0	1	1	0	0	1
High rate approach azimuth	0	0	1	0	1	0	0
Approach elevation	1	1	0	0	0	0	1
Back azimuth	1	0	0	1	0	0	1
Basic data 1	0	1	0	1	0	0	0
Basic data 2	0	1	1	1	1	0	0
Basic data 3	1	0	1	0	0	0	0
Basic data 4	1	0	0	0	1	0	0
Basic data 5	1	1	0	1	1	0	0
Dasic data 6	0	0	0	1	1	0	1
Auxiliary data A	1	1	1	0	0	1	0
Auxiliary data B	1	0	1	0	1	1	1
Auxiliary data C	1	1	1	1	0	0	0

(ii) *Sector signals.* In all azimuth formats, sector signals must be transmitted to provide Morse Code identification, airborne antenna selection, and system test signals. These signals are not required in the elevation formats. In addition, if the signal from an installed ground component results in a valid indication in an area where no valid guidance should exist, OCI signals must be radiated as provided for in the signal format (see Tables 4a, 4b, and 5). The sector signals are defined as follows:

(A) *Morse Code.* DPSK transmissions that will permit Morse Code facility identification in the aircraft by a four letter code starting with the letter ''M'' must be included in all azimuth functions. They must be transmitted and repeated at approximately equal intervals, not less than six times per minute, during which time the ground subsystem is available for operational use. When the transmissions of the ground subsystem are not available, the identification signal must be suppressed. The audible tone in the aircraft is started by setting the Morse Code bit to logic ''1'' and stopped by a logic ''0'' (see Tables 4a and 4b). The identification code characteristics must conform to the following: the dot must be between 0.13 and 0.16 second in duration, and the dash between 0.39 and 0.48 second. The duration between dots and/or dashes must be one dot plus or minus 10%. The duration between characters (letters) must not be less than three dots. When back azimuth is provided, the code shall be transmitted by the approach azimuth and back azimuth within plus or minus 0.08 seconds.

(B) *Airborne antenna selection.* A signal for airborne antenna selection shall be transmitted as a ''zero'' DPSK signal lasting for a six-bit period (see Tables 4a and 4b).

TABLE 4a—APPROACH AZIMUTH FUNCTION TIMING

Event	Event time slot begins at—	
	15.625 kHz clock pulse (number)	Time (milliseconds)
Preamble	0	0
Morse code	25	1.600
Antenna select	26	1.664
Rear OCI	32	2.048
Left OCI	34	2.176
Right OCI	36	2.304
To test	38	2.432
To scan [1]	40	2.560
Pause	....	8.760
Midscan point	....	9.060
FRO scan [1]	....	9.360
FRO test	....	15.560
End Function (Airborne)	....	15.688
End guard time; end function (ground)	....	15.900

AA[1]The actual commencement and completion of the TO and the FRO scan transmissions are dependent on the amount of proportional guidance provided. The time slots provided shall accommodate a maximum scan of plus or minus 62.0 degrees. Scan timing shall be compatible with accuracy requirements.

TABLE 4b—HIGH RATE APPROACH AZIMUTH AND BACK AZIMUTH FUNCTION TIMING

Event	Event time slot begins at—	
	15.625 kHz clock pulse (number)	Time (milliseconds)
Preamble	0	0
Morse Code	25	1.600
Antenna select	26	1.664
Rear OCI	32	2.048
Left OCI	34	2.176
Right OCI	36	2.304
To test	38	2.432
To scan [1]	40	2.560
Pause	....	6.760
Midscan point	....	7.060
FRO scan [1]	....	7.360
FRO test pulse	....	11.560
End function (airborne)	....	11.688
End guard time; end function (ground)	....	11.900

[1] The actual commencement and completion of the TO and the FRO scan transmissions are dependent on the amount of proportional guidance provided. The time slots provided will accommodate a maximum scan of plus or minus 42.0 degrees. Scan timing shall be compatible with accuracy requirements.

(C) *OCI.* Where OCI pulses are used, they must be: (1) greater than any guidance signal in the OCI sector; (2) at least 5 dB less than the level of the scanning beam within the proportional guidance sector; and (3) for azimuth functions with clearance signals, at least 5 dB less than the level of the left (right) clearance pulses within the left (right) clearance sector.

TABLE 5—APPROACH ELEVATION FUNCTION TIMING

Event	Event time slot begins at:	
	15.625 kHz clock pluse (number)	Time (milliseconds)
Preamble	0	0
Processor pause	25	1.600
OCI	27	1.728
To scan [1]	29	1.856
Pause	....	3.406
Midscan point	....	3.606
FRO scan [1]	....	3.806
End function (airborne)	....	5.356
End guard time; end function (ground)	....	5.600

[1] The actual commencement and completion of the TO and FRO scan transmissions are dependent upon the amount of proportional guidance provided. The time slots provided will accommodate a maximum scan of −1.5 degrees to +29.5 degrees. Scan timing shall be compatible with accuracy requirements.

The duration of each pulse measured at the half amplitude point shall be at least 100 microseconds, and the rise and fall times shall be less then 10 microseconds. It shall be permissible to sequentially transmit two pulses in each out-of-coverage indication time slot. Where pulse pairs are used, the duration of each pulse shall be at least 50 microseconds, and the rise and fall times shall be less then 10 microseconds. The transmission of out-of-coverage indication pulses radiated from antennas with overlapping coverage patterns shall be separated by at least 10 microseconds.

NOTE: If desired, two pulses may be sequentially transmitted in each OCI time slot. Where pulse pairs are used, the duration of each pulse must be 45 (±5) microseconds and the rise and fall times must be less than 10 microseconds.

(D) *System test.* Time slots are provided in Tables 4a and 4b to allow radiation of TO and FRO test pulses. However, radiation of these pulses is not required since the characteristics of these pulses have not yet been standardized.

(iii) *Angle encoding.* The encoding must be as follows:

(A) *General.* Azimuth and elevation angles are encoded by scanning a narrow beam between the limits of the proportional coverage sector first in one direction (the TO scan) and then in the opposite direction (the FRO scan). Angular information must be encoded by the amount of time separation between the beam centers of the TO and FRO scanning beam pulses. The TO and FRO transmissions must be symmetrically disposed about the midscan point listed in Tables 4a, 4b, 5, and 7. The midscan point and the center of the time interval between the TO and FRO scan transmissions must coincide with a tolerance of ±10 microseconds. Angular coding must be linear with angle and properly decoded using the formula:

$$\theta = \frac{V}{2}\left(T_0 - t\right)$$

where:

θ=Receiver angle in degrees.

V= Scan velocity in degrees per microsecond.

T_0=Time separation in microseconds between TO and FRO beam centers corresponding to zero degrees.

t= Time separation in microseconds between TO and FRO beam centers.

The timing requirements are listed in Table 6 and illustrated in Figure 7.

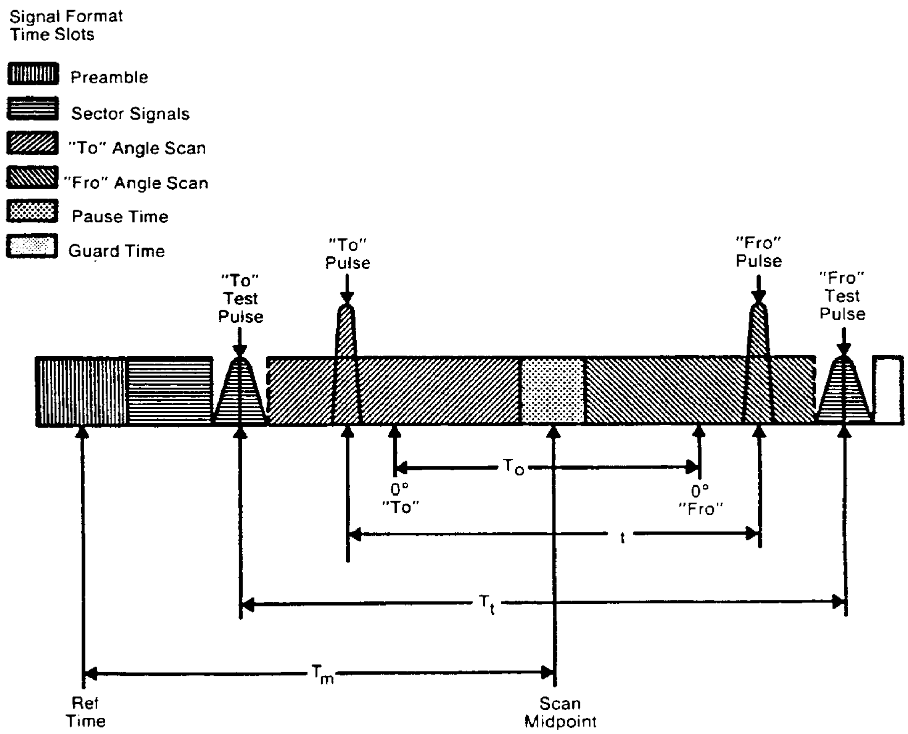


Figure 7. Azimuth Angle Scan Timing (Not to Scale)

(B) *Azimuth angle encoding.* Each guidance angle transmitted must consist of a clockwise TO scan followed by a counterclockwise FRO scan as viewed from above the antenna. For approach azimuth functions, increasing angle values must be in the direction of the TO scan; for the back azimuth function, increasing angle values must be in the direction of the FRO scan. The antenna has a narrow beam in the plane of the scan direction and a broad beam in the orthogonal plane which fills the vertical coverage.

(C) *Elevation angle encoding.* The radiation from elevation equipment must produce a beam which scans from the horizon up to the highest elevation angle and then scans back down to the horizon. The antenna has a narrow beam in the plane of the scan direction and a broad beam in the orthogonal plane which fills the horizontal coverage. Elevation angles are defined from the horizontal plane containing the antenna phase center; positive angles are above the horizontal and zero angle is along the horizontal.

(iv) *Clearance guidance.* The timing of the clearance pulses must be in accordance with Figure 8. For azimuth elements with proportional coverage of less than ±40 degrees (±20 degrees for back azimuth), clearance guidance information must be provided by transmitting pulses in a TO and FRO format adjacent to the stop/start times of the scanning beam signal. The fly-right clearance pulses must represent positive angles and the fly-left clearance pulses must represent negative angles. The duration of each clearance pulse must be 50 microseconds with a tolerance of ±5 microseconds. The transmitter switching time between the clearance pulses and the scanning beam transmissions must not exceed 10 microseconds. The rise time at the edge of each clearance pulse must be less than 10 microseconds. Within the fly-right clearance guidance section, the fly-right clearance guidance signal shall exceed scanning beam antenna sidelobes and other guidance and OCI signals by at least 5 dB; within the fly-left clearance guidance sector, the fly left clearance guidance signal shall exceed scanning beam antenna sidelobes and all other guidance and OCI signals by at least 5 dB; within the proportional guidance sector, the clearance guidance signals shall be at least 5dB below the proportional guidance signal. Optionally, clearance guidance may be provided by scanning throughout the approach guidance sector. For angles outside the approach azimuth proportional coverage limits as set in Basic Data Word One (Basic Data Word 5 for back azimuth), proper decode and display of clearance guidance must occur to the limits of the guidance region. Where used, clearance pulses shall be transmitted adjacent to the scanning beam signals at the edges of proportional coverage as shown in Figure 8. The proportional coverage boundary shall be established at one beamwidth inside the scan start/stop angles, such that the transition between scanning beam and clearance signals occurs outside the proportional coverage sector. When clearance pulses are provided in conjunction with a narrow beamwidth (e.g., one degree) scanning antenna, the scanning beam antenna shall radiate for 15 microseconds while stationary at the scan start/stop angles.

(3) *Data function format.* Basic data words provide equipment characteristics and certain siting information. Basic data words must be transmitted from an antenna located at the approach azimuth or back azimuth site which provides coverage throughout the appropriate sector. Data function timing must be in accordance with Table 7a.

TABLE 6—ANGLE SCAN TIMING CONSTANTS

Function	Max value of $_t$(usec)	T_o(usec)	V(deg/usec)	T_m (usec)	Pause time (usec)	T_t (usec)
Approach azimuth	13,000	6,800	0.02	7,972	600	13,128
High rate approach azimuth	9,000	4,800	0.02	5,972	600	9,128
Approach elevation	3,500	3,350	0.02	2,518	400	N/A
Back azimuth	9,000	4,800	−0.02	5,972	600	9,128

TABLE 7a—BASIC DATA FUNCTION TIMING

Event	Event time slot begins at:[1]	
	15.625 kHz clock pulse (number)	Time (milliseconds)
Preamble	0	0
Data transmission (bits I_{13}–I_{30}	25	1.600
Parity transmission (bits I_{31}–I_{32}	43	2.752
End function (airborne)	45	2.880
End guard time: end function (ground)	....	3.100

[1] The previous event time slot ends at this time.

TABLE 7b—AUXILIARY DATA FUNCTION TIMING—(DIGITAL)

Event	Event time slot begins at:	
	15.625 kHz clock pulse (number)	Time (milliseconds)
Preamble	0	0
Address transmission (bits I_{13}–I_{20})	25	1.600
Data transmission: (bits I_{21}–I_{69})	33	2.112
Parity transmission (bits I_{70}–I_{76})	82	5.248
End function (airborne)	89	5.696
End guard time; end function (ground)	....	5.900

TABLE 7c—AUXILIARY DATA FUNCTION TIMING—(ALPHANUMERIC)

Event	Event time slot begins at:	
	15.615 kHz clock pulse (number)	Time (milliseconds)
Preamble	0	0
Address transmission (bits I_{13}–I_{20})	25	1.600
Data transmission: (bits I_{21}–I_{76}	33	2.112
End function (airborne)	89	5.696
End guard time; (end function ground)	....	5.900

(i) *Preamble.* Must be in accordance with requirements of § 171.311(i)(1).

(ii) *Data transmissions.* Basic data must be transmitted using DPSK modulation. The content and repetition rate of each basic data word must be in accordance with Table 8a. For data containing digital information, binary number 1 must represent the lower range limit with increments in binary steps to the upper range limit shown in Table 8a. Data containing digital information shall be transmitted with the least significant bit first.

(j) *Basic Data word requirements.* Basic Data shall consist of the items specified in Table 8a. Basic Data word contents shall be defined as follows:

(1) *Approach azimuth to threshold distance* shall represent the minimum distance between the Approach Azimuth antenna phase center and the vertical plane perpendicular to the centerline which contains the landing threshold.

(2) *Approach azimuth proportional coverage limit* shall represent the limit of the sector in which proportional approach azimuth guidance is transmitted.

(3) *Clearance signal type* shall represent the type of clearance when used. Pulse clearance is that which is in accordance with § 171.311 (i) (2) (iv). Scanning Beam (SB) clearance indicates that the proportional guidance sector is limited by the proportional coverage limits set in basic data.

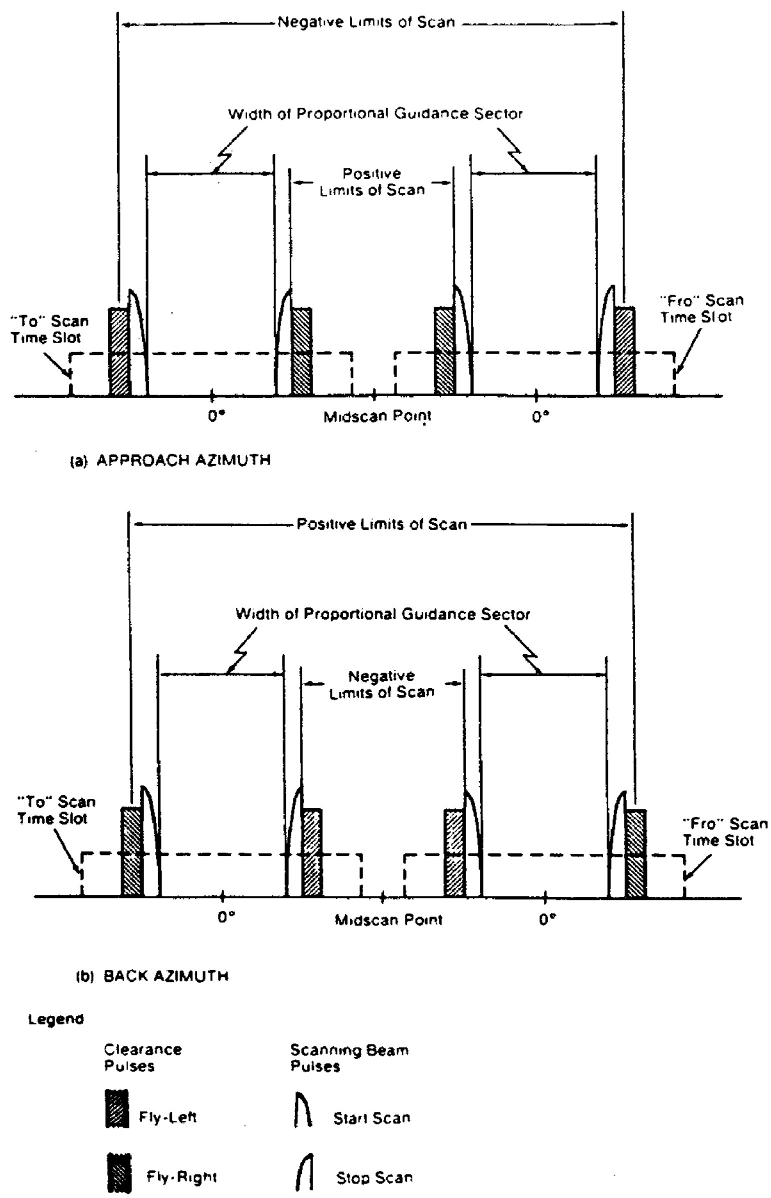


Figure 8. Clearance Pulse Timing for Azimuth Functions

TABLE 8a—BASIC DATA WORDS

Data bit #	Data item definition	LSB value	Data bit value
	Basic Data Word No. 1		
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			0
7			1
8			0
9			1
10			0
11			0
12			0
13	Approach azimuth to threshold distance (Om − 630m).	100m	100m
14			200m
15			400m
16			800m
17			1600m
18			3200m
19	Approach azimuth proportional coverage limit (negative limit) (0° to −62°.	2°	−2°
20			−4°
21			−8°
22			−16°
23			−32°
24	Approach azimuth proportional coverage limit (positive limit) (0° to +62°.	2°	2°
25			4°
26			8°
27			16°
28			32°
29	Clearance signal type	N/A	0=pulse; 1=SB
30	Spare		Transmit zero
31	Parity: (13+14+15. . .+30 +31=odd).	N/A	N/A
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

Note 1: Transmit throughout the Approach Azimuth guidance sector at intervals of 1.0 seconds or less.
Note 2: The all zero state of the data field represents the lower limit of the absolute value of the coded parameter unless otherwise noted.

Data bit #	Data item definition	LSB value	Data bit value
	Basic Data Word No. 2		
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			0
7			1
8			1
9			1
10			1
11			0
12			0
13	Minimum glide path (2.0° to 14.7°.	0.1°	0.1°
14			0.2°
15			0.4°
16			0.8°
17			1.6°
18			3.2°
19			6.4°
20	Back azimuth status		see note 4
21	DME status		see note 6
22			
23	Approach azimuth status		see note 4
24	Approach azimuth status		see note 4
25	Spare		Transmit zero
26	......do		Do.
27	......do		Do.
28	......do		Do.
29	......do		Do.
30	......do		Do.
31	Parity: (13+14+15. . .+30 +31)=odd).	N/A	N/A
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

Note 1: Transmit throughout the Approach Azimuth guidance sector at intervals of 0.16 seconds or less.
Note 2: The all zero state of the data field represents the lower limit of the absolute range of the coded parameter unless otherwise noted.

Data bit #	Data item definition	LSB value	Data bit value
	Basic Data Word No. 3		
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			1
7			0
8			1
9			0
10			0
11			0
12			0
13	Approach azimuth beamwidth (0.5° − 4.0°) See note 7.	0.5°	0.5°
14			1.0°
15			2.0°
16	Approach elevation beamwidth (0.5° to 2.5°) See note 7.	0.5°	0.5°
17			1.0°
18	Note: values greater than 2.5° are invalid.		2.0°
19	DME distance (Om to 6387.5m.	12.5m	12.5m
20			25.0m
21			50.0m
22			100.0m
23			200.0m
24			400.0m
25			800.0m
26			1600.0m
27			3200.0m
28	Spare		Transmit zero
29	......do		Do.
30	......do		Do.
31	Parity: (13+14+15. . .+30 +31=odd).		
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

TABLE 8a—BASIC DATA WORDS—Continued

Data bit #	Data item definition	LSB value	Data bit value

Note 1: Transmit throughout the Approach Azimuth guidance sector at intervals of 1.0 seconds or less.
Note 2: The all zero state of the data field represents the lower limit of the absolute range of the coded parameter unless otherwise noted.

Basic Data Word No. 4

Data bit #	Data item definition	LSB value	Data bit value
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			1
7			0
8			0
9			0
10			1
11			0
12			0
13	Approach azimuth magnetic orientation (0° to 359°.	1°	1°
14			2°
15			4°
16			8°
17			16°
18			32°
19			64°
20			128°
21			256°
22	Back azimuth magnetic orientation (0° to 359°.	1°	1°
23			2°
24			4°
25			8°
26			16°
27			32°
28			64°
29			128°
30			256°
31	Parity: (13+14+15. . .+30 +31=odd).	N/A	N/A
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

Note 1: Transmit at intervals of 1.0 second or less throughout the Approach Azimuth guidance sector, except when Back Azimuth guidance is provided. See Note 8.
Note 2: The all zero state of the data field represents the lower limit of the absolute range of the coded parameter unless otherwise noted.

Basic Data Word No. 5

Data bit #	Data item definition	LSB value	Data bit value
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			1
7			1
8			0
9			1
10			1
11			0
12			0
13	Back azimuth proportional coverage negative limit (0° to −42°.	2°	−2°
14			−4°
15			−8°
16			−16°
17			−32°
18	Back azimuth proportional coverage positive limit (0° to +42°.	2°	2°
19			4°
20			8°
21			16°
22			32°
23	Back azimuth beamwidth (0.5° to 4.0°) See note 7.	0.5°	0.5°
24			1.0°
25			2.0°
26	Back azimuth status		See Note 10
27	......do		Do.
28	......do		Do.
29	......do		Do.
30	......do		Do.
31	Parity: (13+14+15. . .+30 +31=odd).	N/A	N/A
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

Note 1: Transmit only when Back Azimuth guidance is provided. See note 9.
Note 2: The all zero state of the data filed represents the lower limit of the absolute range of the coded parameter unless otherwise noted.

Basic Data Word No. 6

Data bit #	Data item definition	LSB value	Data bit value
1	Preamble	N/A	1
2			1
3			1
4			0
5			1
6			0
7			0
8			0
9			1
10			1
11			0
12			1
(13–30)	MLS ground equipment identification (Note 3).		
13	Character 2	N/A	B1
14			B2
15			B3
16			B4
17			B5
18			B6
19	Character 3	N/A	B1
20			B2
21			B3
22			B4
23			B5
24			B6
25	Character 4	N/A	B1
26			B2
27			B3
28			B4
29			B5
30			B6
31	Parity: (13+14+15. . .+30 +31=odd).	N/A	N/A

TABLE 8a—BASIC DATA WORDS—Continued

Data bit #	Data item definition	LSB value	Data bit value
32	Parity: (14+16+18. . .+30 +32=odd).	N/A	N/A

Note 1: Transmit at intervals of 1.0 second or less throughout the Approach Azimuth guidance sector, except when Back Azimuth guidance is provided. See note 8.

Note 3: Characters are encoded using the International Alphabet Number 5, (IA–5):

Note 4: Coding for status bit:

0=Function not radiated, or radiated in test mode (not reliable for navigation).

1=Function radiated in normal mode (for Back Azimuth, this also indicates that a Back Azimuth transmission follows).

Note 5: Date items which are not applicable to a particular ground equipment shall be transmitted as all zeros.

Note 6: Coding for status bits:

I_{21}	I_{22}	
0	0	DME transponder inoperative or not available.
1	0	Only IA mode or DME/N available.
0	0	FA mode, Standard 1, available.
1	1	FA mode, Standard 2, available.

Note 7: The value coded shall be the actual beamwidth (as defined in § 171.311 (j)(9) rounded to the nearest 0.5 degree.

Note 8: When back Azimuth guidance is provided, Data Words 4 and 6 shall be transmitted at intervals of 1.33 seconds or less throughout the Approach Azimuth coverage and 4 seconds or less throughout the Back Azimuth coverage.

Note 9: When Back Azimuth guidance is provided, Data Word 5 shall be transmitted at an interval of 1.33 seconds or less throughout the Back Azimuth coverage sector and 4 seconds or less throughout the Approach Azimuth coverage sector.

Note 10: Coding for status bit:

0=Function not radiated, or radiated in test mode (not reliable for navigation).

1=Function radiated in normal mode.

(4) *Minimum glidepath* the lowest angle of descent along the zero degree azimuth that is consistent with published approach procedures and obstacle clearance criteria.

(5) *Back azimuth status* shall represent the operational status of the Back Azimuth equipment.

(6) *DME status* shall represent the operational status of the DME equipment.

(7) *Approach azimuth status* shall represent the operational status of the approach azimuth equipment.

(8) *Approach elevation status* shall represent the operational status of the approach elevation equipment.

(9) *Beamwidth* the width of the scanning beam main lobe measured at the -3 dB points and defined in angular units on the antenna boresight, in the horizontal plane for the azimuth function and in the vertical plane for the elevation function.

(10) *DME distance* shall represent the minimum distance between the DME antenna phase center and the vertical plane perpendicular to the runway centerline which contains the MLS datum point.

(11) *Approach azimuth magnetic orientation* shall represent the angle measured in the horizontal plane clockwise from Magnetic North to the zero-degree angle guidance radial originating from the approach azimuth antenna phase center. The vertex of the measured angle shall be at the approach azimuth antenna phase center.

NOTE: For example, this data item would be encoded 090 for an approach azimuth antenna serving runway 27 (assuming the magnetic heading is 270 degrees) when sited such that the zero degree radial is parallel to centerline.

(12) *Back azimuth magnetic orientation* shall represent the angle measured in the horizontal plane clockwise from Magnetic North to the zero-degree angle guidance radial originating from the Back Azimuth antenna. The vertex of the measured angle shall be at the Back Azimuth antenna phase center.

NOTE: For example, this data item would be encoded 270 for a Back Azimuth Antenna serving runway 27 (assuming the magnetic heading is 270 degrees) when sited such that the zero degree radial is parallel to centerline.

(13) *Back azimuth proportional coverage limit* shall represent the limit of the sector in which proportional back azimuth guidance is transmitted.

(14) *MLS ground equipment identification* shall represent the last three characters of the system identification specified in § 171.311(i)(2). The characters shall be encoded in accordance with International Alphabet No. 5 (IA–5) using bits b_1 through b_6.

NOTE: Bit b_7 of this code may be reconstructed in the airborne receiver by taking the complement of bit b_6.

(k) *Residual radiation*. The residual radiation of a transmitter associated with an MLS function during time intervals when it should not be transmitting shall not adversely affect the reception of any other function. The residual radiation of an MLS function at times when another function is radiating shall be at least 70 dB below the level provided when transmitting.

(l) *Symmetrical scanning.* The TO and FRO scan transmissions shall be symmetrically disposed about the mid-scan point listed in Tables 4a, 4b and 5. The mid-scan point and the center of the time interval between the TO and FRO scan shall coincide with a tolerance of plus or minus 10 microseconds.

(m) *Auxiliary data*—(1) *Addresses.* Three function identification codes are reserved to indicate transmission of Auxiliary Data A, Auxiliary Data B, and Auxiliary Data C. Auxiliary Data A contents are specified below, Auxiliary Data B contents are reserved for future use, and Auxiliary Data C contents are reserved for national use. The address codes of the auxiliary data words shall be as shown in Table 8b.

(2) *Organization and timing.* The organization and timing of digital auxiliary data must be as specified in Table 7b. Data containing digital information must be transmitted with the least significant bit first. Alphanumeric data characters must be encoded in accordance with the 7-unit code character set as defined by the American National Standard Code for Information Interchange (ASCII). An even parity bit is added to each character. Alphanumeric data must be transmitted in the order in which they are to be read. The serial transmission of a character must be with the lower order bit transmitted first and the parity bit transmitted last. The timing for alphanumeric auxiliary data must be as shown in Table 7c.

(3) *Auxiliary Data A content:* The data items specified in Table 8c are defined as follows:

(i) *Approach azimuth antenna offset* shall represent the minimum distance between the Approach Azimuth antenna phase center and the vertical plane containing the runway centerline.

(ii) *Approach azimuth to MLS datum point distance* shall represent the minimum distance between the Approach Azimuth antenna phase center and the vertical plane perpendicular to the centerline which contains the MLS datum point.

(iii) *Approach azimuth alignment with runway centerline* shall represent the minimum angle between the approach azimuth antenna zero-degree guidance plane and the runway certerline.

(iv) *Approach azimuth antenna coordinate system* shall represent the coordinate system (planar or conical) of the angle data transmitted by the approach azimuth antenna.

(v) *Approach elevation antenna offset* shall represent the minimum distance between the elevation antenna phase center and the vertical plane containing the runway centerline.

(vi) *MLS datum point to threshold distance* shall represent the distance measured along the runway centerline from the MLS datum point to the runway threshold.

(vii) *Approach elevation antenna height* shall represent the height of the elevation antenna phase center relative to the height of the MLS datum point.

(viii) *DME offset* shall represent the minimum distance between the DME antenna phase center and the vertical plane containing the runway centerline.

(ix) *DME to MLS datum point distance* shall represent the minimum distance between the DME antenna phase center and the vertical plane perpendicular to the centerline which contains the MLS datum point.

(x) *Back azimuth antenna offset* shall represent the minimum distance between the back azimuth antenna phase center and the vertical plane containing the runway centerline.

(xi) *Back azimuth to MLS datum point distance* shall represent the minimum distance between the Back Azimuth antenna and the vertical plane perpendicular to the centerline which contains the MLS datum point.

(xii) *Back azimuth antenna alignment with runway centerline* shall represent the minimum angle between the back azimuth antenna zero-degree guidance plane and the runway centerline.

§ 171.313 Azimuth performance requirements.

This section prescribes the performance requirements for the azimuth equipment of the MLS as follows:

(a) *Approach azimuth coverage requirements.* The approach azimuth equipment must provide guidance information in at least the following volume of space (see Figure 9):

TABLE 8b-—AUXILIARY DATA WORD ADDRESS CODES

No.	I_{13}	I_{14}	I_{15}	I_{16}	I_{17}	I_{18}	I_{19}	I_{20}
1.	0	0	0	0	0	1	1	1
2.	0	0	0	0	1	0	1	0